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(54) Load cell

(57) A load cell comprises a base support (1), an opposed load support (2) and a substantially S-shaped deflection beam (3) mounted between the base support (1) and the load support (2), the beam (3) and at least one of said supports (1) having co-operating part-spherical bearing surfaces (10, 12) therebetween which enable the beam (3) and the at least one support (1) to adjust relative to one another in response to uneven loads. The beam 3 is secured to the load support 2 by pins 8 engaging in opposed flanges 7 of the support 2 and is secured to the base support 1 by pins 13 engaging in opposed flanges 5 of base support 1 and passing with clearance through holes in the beam 3. Strain gauges are mounted in aperture(s) 16 in beam 3. The load cell may be used in weighing hoppers, tanks or weighbridges.

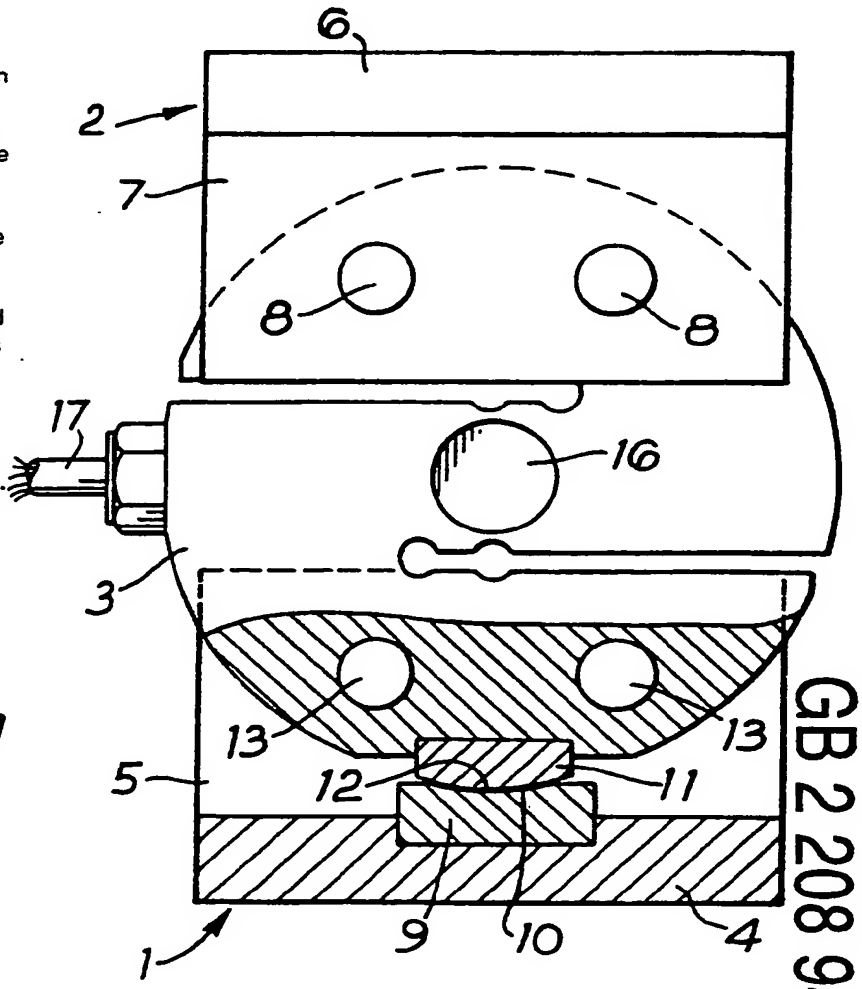

Fig. 1

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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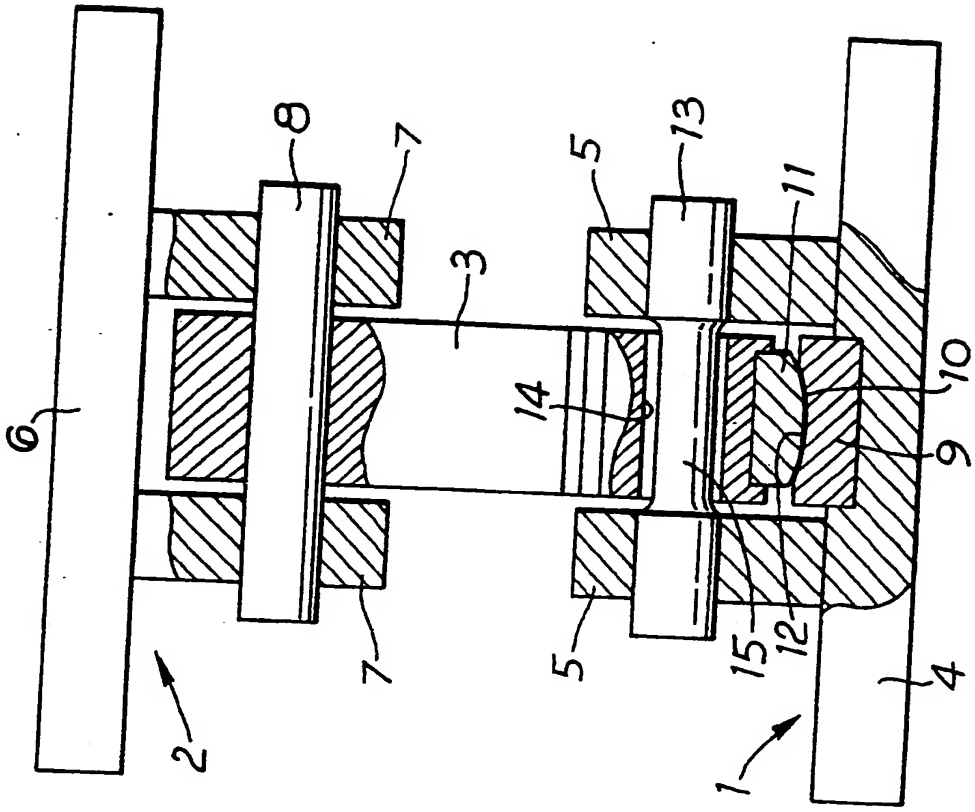

Fig. 2

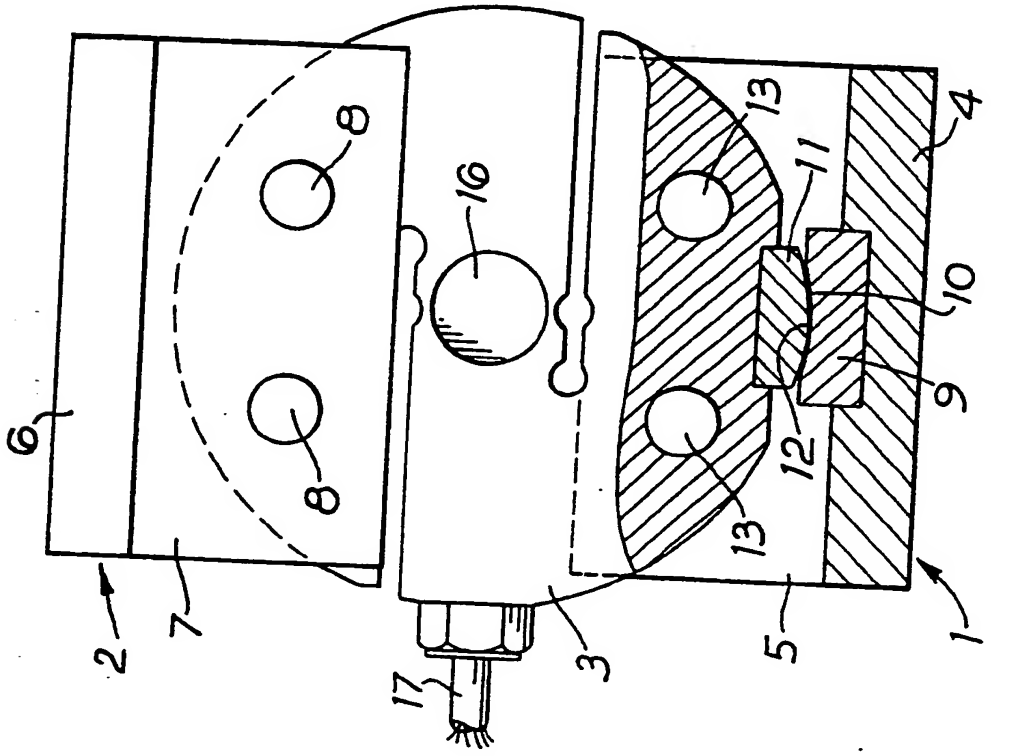

Fig. 1

LOAD CELL

This invention relates to load cells.

Load cells comprising a deflection beam and means for measuring deflections of the beam are used in weighing apparatus for weighing loads such as the contents of hoppers or tanks, or in weighbridges for weighing commercial vehicles and the like. In such environments it is not uncommon for the load to become unevenly distributed on the load cell and this can lead to inaccurate readings.

It is an object of the present invention to provide a load cell which can be simple and robust in its construction, which can be relatively compact and which is capable of automatically adjusting uneven loads.

The present provides a load cell comprising a base support, an opposed load support, a substantially S-shaped deflection beam mounted between the base support and the load support and means for measuring deflections of the beam when sufficient load is applied to the load support, the said beam and at least of one said supports having co-operating part-spherical bearing surfaces which enable the beam and the at least one support to adjust relative to one another in response to an uneven load.

Said beam and said at least one support may each have a bearing pad thereon providing a said bearing surface, one of said pads providing a concave bearing surface and the other bearing pad providing a convex bearing surface.

Preferably said base support has a said bearing surface thereon which co-operates with said bearing surface of said beam. According to another embodiment, both said base support and said load support each have a part-spherical bearing surface thereon which co-operates with a corresponding part-spherical bearing surface of said beam. Thus, in this alternative embodiment, the

beam has first and second bearing surfaces thereon which co-operate respectively with the bearing surfaces on the base support and the load support.

The beam may be secured to said at least one support by means allowing limited relative movement between the beam and the support. Said supports may each comprise a plate having spaced opposed flanges extending outwardly therefrom between which said beam is received. The beam may be secured to said at least one support by at least one pin which extends through said flanges and with clearance through an aperture in said beam, thereby allowing of said limited relative movement. The load cell may be secured to the other of said supports by at least one pin which extends through the opposed flanges of the other support and through said beam.

Said measuring means may comprise one or more strain sensors or strain gauges for measuring sheer forces in said beam when a load is applied thereto.

The present invention will be more particularly described with reference to the accompanying drawings, in which:-

Figure 1 is a part-sectional side elevation of a load cell according to the present invention, and

Figure 2 is a part-sectional end elevation of the load cell shown in Figure 1.

Referring to the drawings it will be seen that the load cell illustrated therein comprises a base support (1) an opposed load support (2) and a substantially S-shaped deflection beam (3).

The base support (1) comprises a plate (4) having opposed flanges (5) extending outwardly therefrom between which the beam (3) is received. Likewise, the load support (2) comprises a plate (6) having opposed flanges (7) extending outwardly therefrom between which the beam (3) is received. The beam (3) is secured to the load support (2) by means of pins (8) which extend through the

flanges (7) and through the beam (3).

The plate (4) of the base support (1) has a bearing pad (9) mounted thereon which provides a part-spherical concave bearing surface (10). The beam (3) has mounted thereon a bearing pad (11) providing a part-spherical convex bearing surface (12) which co-operates with the bearing surface (10) of the bearing pad (9). Thus, the beam (3) is supported on the base support (1) by the co-operation of the bearing surfaces (10, 12) and the beam (3) and base support (1) can adjust relative to one another in response to an uneven load applied on the load support (2).

The beam (3) is secured to the base support (1) in a manner allowing limited relative movement between the beam (3) and the load support (1) to allow said relative adjustment to take place. Thus, in the illustrated embodiment the beam (3) is secured to the load support (1) by pins (13) which extend through the flanges (5) and with clearance through apertures (14) in the beam (3) as shown in Figure (2). To provide such clearance the pins (13) have an intermediate portion (15) of reduced diameter as shown, although it will be understood that if desired, the pins (13) could be of the same diameter throughout their length and enlarged diameter apertures (14) provided in the beam (3).

The beam (3) may have a recess (16) in a side surface thereof for receiving one or more strain gauges (not shown) which can be electrically connected by means of electric cable (17) to suitable measuring apparatus of a kind well-known in the art and therefore not shown.

Claims

1. A load cell comprising a base support (1), an opposed load support (2), a substantially S-shaped deflection beam (3) mounted between the base support (1) and the load support (2) and means for measuring deflections of the beam when a sufficient load is applied to the load support (2), characterised in that the said beam (3) and at least one of said supports (1) have co-operating part-spherical bearing surfaces (10, 12) which enable the beam (3) and the at least one support (1) to adjust relative to one another in response to an uneven load.

2. A load cell according to claim 1, wherein said base support (1) has a said bearing surface (10) thereon which co-operates with said bearing surface (12) of said beam (3).

3. A load cell according to claim 2, wherein said load support (2) also has a part-spherical bearing surface thereon which co-operates with a second part-spherical bearing surface of said beam (3).

4. A load cell according to claim 1, 2 or 3, wherein said beam (3) and said at least one said support (1) each have a bearing pad (9, 11) thereon providing a said bearing surface (10, 12), one of said pads (9) providing a concave bearing surface (10) and the other bearing pad (11) providing a convex bearing surface (12).

5. A load cell according to any one of the preceding claims, wherein said beam (3) is secured to said at least one support (1) by means (5, 13, 14) allowing limited relative movement between the beam (3) and the support (1).

6. A load cell according to any one of the preceding claims, wherein said supports (1, 2) each comprise a plate (4, 6) having spaced opposed flanges (5, 7) extending outwardly therefrom between which said beam (3) is received.

7. A load cell according to claims 5 and 6, wherein said beam (3) is secured to said at least one support (1) by at least one pin (13) which extends through said flanges (5) and with clearance through an aperture (14) in said beam (3).

8. A load cell according to claim 7, wherein said beam (3) is secured to the other of said supports (2) by at least one pin (8) which extends through the opposed flanges (7) of the other support (2) and through said beam (3).

9. A load cell according to any one of the preceding claims, wherein said measuring means comprises one or more strain sensors or strain gauges.

Amendments to the claims have been filed as follows

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1. A load cell comprising a base support (1), an opposed load support (2), a deflection beam (3) mounted between the base support (1) and the load support (2) and means for measuring deflections of the beam when a sufficient load is applied to the load support (2), characterised in that the deflection beam (3) comprises a substantially S-shaped substantially circular disc and the said beam (3) and at least one of said supports (1) have co-operating part-spherical bearing surfaces (10, 12) which enable the beam (3) and the at least one support (12) to adjust relative to one another in response to an uneven load.

2. A load cell according to claim 1, wherein said base support (1) has a said bearing surface (10) thereon which co-operates with said bearing surface (12) of said beam (3).

3. A load cell according to claim 2, wherein said load support (2) also has a part-spherical bearing surface thereon which co-operates with a second part-spherical bearing surface of said beam (3).

4. A load cell according to claim 1, 2 or 3, wherein said beam (3) and said at least one said support (1) each have a bearing pad (9, 11) thereon providing a said bearing surface (10, 12), one of said pads (9) providing a concave bearing surface (10) and the other bearing pad (11) providing a convex bearing surface (12).

5. A load cell according to any one of the preceding claims, wherein said beam (3) is secured to said at least one support (1) by means (5, 13, 14) allowing limited relative movement between the beam (3) and the support (1).

6. A load cell according to any one of the preceding claims, wherein said supports (1, 2) each comprise a plate (4, 6) having spaced opposed flanges (5, 7) extending outwardly therefrom between which said beam (3) is received.

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